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EXAMINER

MAIER, LEIGH C

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/677,436  
Filing Date: October 02, 2003  
Appellant: ZHANG, LIFENG

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Leah Reimer  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed April 19, 2010 appealing from the Office action mailed August 18, 2009.

**(1) Real Party in Interest**

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The following is a list of claims that are rejected and pending in the application:

Claims 1, 4, 6-9, 10, 12, 13, 16-24, 29 and 30 are pending.

Claims 4 and 6-9 are withdrawn from consideration.

Claims 10, 12, 13 and 16-24 are allowed.

Claims 1, 29 and 30 are rejection.

**(4) Status of Amendments After Final**

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

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**(5) Summary of Claimed Subject Matter**

The examiner has no comment on the summary of claimed subject matter contained in the brief.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The examiner has no comment on Appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

**(7) Claims Appendix**

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

**(8) Evidence Relied Upon**

5,137,571	Eisenhart et al	8-1992
4,079,028	Emmons et al	3-1978
5,376,709	Lau et al	12-1994
5,521,266	Lau	5-1996
4,476,734	Tsuchiyama et al	5-1988

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7,125,919	Harris et al	10-2006
6,887,928	Tanzer et al	5-2005

### **(9) Grounds of Rejection**

The following grounds of rejection are applicable to the appealed claims:

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eisenhart et al (US 5,137,571) in view of Emmons et al (US 4,079,028).

Eisenhart teaches the use of cyclodextrins in combination with associative thickeners, such as hydrophobically modified polyethoxylated urethane thickeners, for viscosity modification. The basis of the modification involves the complexation of the cyclodextrin with the hydrophobic moieties of the thickener. See abstract. The reference exemplifies the use of a

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polyethoxylated urethane thickener (QR-708) and various cyclodextrins. See examples. The reference does not exemplify thickeners based on the diisocyanates recited in the claims. However, the reference further discloses that hydrophobically modified polyethoxylated urethane thickeners are known and disclosed by Emmons. See col 1, 59-62.

Emmons teaches the preparation of hydrophobically modified polyethoxylated urethane thickeners using a variety of diisocyanates. See paragraph bridging col 8-9. The four recited diisocyanates are also the first four in the list in col 8.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to select any of the hydrophobically modified polyethoxylated urethane thickeners taught by Emmons with a reasonable expectation of success because Eisenhart suggests their use in order to eliminate the need for organic solvents as viscosity modifiers.

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eisenhart et al (US 5,137,571) in view of Emmons et al (US 4,079,028) and further in view of Lau et al (US 5,376,709) and Lau et al (US 5,521,266).

Eisenhart and Emmons teach as set forth above.

Eisenhart teaches the general concept of using a variety of cyclodextrins—alpha, beta and gamma, unmodified and modified—in combination with hydrophobically modified associative thickeners to eliminate the use of organic cosolvents and surfactants necessary to prepare aqueous compositions. See col 1, lines 18-51.

Eisenhart does not teach the use of methyl  $\alpha$ -cyclodextrin.

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Lau '709 teaches the use of methyl  $\beta$ -cyclodextrin as a viscosity modifier in combination with hydrophobically modified urethane thickeners. See abstract and Example 1. The teaching is limited to  $\beta$ -cyclodextrin, but this appears to be based on the availability of particular modified cyclodextrins at the time of the Lau '709 disclosure. See paragraph bridging col 1-2.

Lau '266 discloses the use of variously modified cyclodextrins, including methylated  $\alpha$ -cyclodextrin. See col 3, lines 51-67.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to select any of the hydrophobically modified polyethoxylated urethane thickeners taught by Emmons with a reasonable expectation of success as discussed above. Furthermore, Eisenhart teaches the use of unmodified  $\alpha$ -,  $\beta$ - and  $\gamma$ -cyclodextrins, as well as generically modified  $\alpha$ -,  $\beta$ - and  $\gamma$ -cyclodextrins. Therefore, in view of the teaching of Lau '709 regarding the utility of methyl  $\beta$ -cyclodextrin, it would be further obvious to modify the combination of Eisenhart and Emmons by the use of any available modified cyclodextrin, such as methyl  $\alpha$ -cyclodextrin, disclosed by Lau '266, with a reasonable expectation of success.

Claims 29 and 30 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 4 of U.S. Patent No. 7,125,919 in view of Emmons et al (US 4,079,028). Although the conflicting claims are not identical, they are not patentably distinct from each other.

The claims of '919 are drawn to a tinting composition comprising a generic hydrophobically modified ethylene oxide urethane block copolymer and a generic macromolecular organic compound having a hydrophobic cavity. The written description of the

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latter component comprises various cyclodextrins. See col 6, lines 4-20. The claims do not recite particular hydrophobically modified ethylene oxide urethane block copolymers.

Emmons teaches as set forth above. The disclosed hydrophobically modified ethylene oxide urethane block copolymers have utility for preparing paint, a tinting composition comprising a colorant.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to prepare the recited composition with cyclodextrins because they are disclosed in the written description of “macromolecular organic compound having a hydrophobic cavity.” It would be further obvious to select any hydrophobically modified ethylene oxide urethane block copolymer known to have utility for the preparation of tinting compositions, such as paint. In doing so, one of ordinary skill would arrive at the instant invention with a reasonable expectation of success.

Applicant presents no new arguments not already addressed above.

Claims 29 and 30 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 3 of U.S. Patent No. 6,887,928 in view of Emmons et al (US 4,079,028). Although the conflicting claims are not identical, they are not patentably distinct from each other.

The claims of ‘928 are drawn to a method of improving the viscosity stability of a coating composition comprising a generic hydrophobically modified ethylene oxide urethane block copolymer and an associative thickener, such as a generic macromolecular organic compound having a hydrophobic cavity. The written description of the latter component comprises various



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cyclodextrins. See col 4, lines 33-58. The claims do not recite particular hydrophobically modified ethylene oxide urethane block copolymers.

Emmons teaches as set forth above. The disclosed hydrophobically modified ethylene oxide urethane block copolymers have utility for preparing paint, a coating composition comprising a colorant.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to carry out the reference method with a cyclodextrin because they are disclosed in the written description of “macromolecular organic compound having a hydrophobic cavity.” It would be further obvious to select any hydrophobically modified ethylene oxide urethane block copolymer known to have utility for the preparation of a coating composition, such as paint. In doing so, one of ordinary skill would arrive at the instant invention with a reasonable expectation of success.

Claims 29 and 30 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 5,376,709 in view of Emmons et al (US 4,079,028). Although the conflicting claims are not identical, they are not patentably distinct from each other.

The claims of ‘709 are drawn to a method for eliminating the need for organic solvents in a composition comprising a hydrophobic thickener, such as generic hydrophobically modified polyethoxylated urethane by the addition of methyl  $\beta$ -cyclodextrin. The claims do not recite particular hydrophobically modified ethylene oxide urethane block copolymers.

Emmons teaches as set forth above.

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It would have been obvious to one having ordinary skill in the art at the time the invention was made to carry out the reference method for the elimination of organic solvent using a thickener known to require the addition of an organic solvent as a viscosity modifier with a reasonable expectation of success. In doing so, the artisan would arrive at the instant composition.

Claims 29 and 30 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 2 of U.S. Patent No. 5,137,571 in view of Emmons et al (US 4,079,028). Claim 1 is rejected further in view of Lau et al (US 5,376,709) and Lau et al (US 5,521,266). Although the conflicting claims are not identical, they are not patentably distinct from each other.

The claims of '928 are drawn to a method for eliminating the need for organic solvents in a composition comprising a hydrophobic thickener, such as generic hydrophobically modified polyethoxylated urethane by the addition of a cyclodextrin. The claims do not recite particular hydrophobically modified ethylene oxide urethane block copolymers.

Emmons teaches as set forth above.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to carry out the reference method for the elimination of organic solvent using a thickener known to require the addition of an organic solvent as a viscosity modifier with a reasonable expectation of success. In doing so, the artisan would arrive at the instant composition.

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With respect to claim amended claim 1, Lau '709 and Lau '266 teach as set forth above. The claims recite the use of unmodified  $\alpha$ -,  $\beta$ - and  $\gamma$ -cyclodextrins, as well as modified  $\alpha$ -,  $\beta$ - and  $\gamma$ -cyclodextrins. Therefore, in view of the teaching of Lau '709 regarding the utility of methyl  $\beta$ -cyclodextrin, it would be further obvious to modify the combination of Eisenhart and Emmons by the use of any available modified cyclodextrin, such as methyl  $\alpha$ -cyclodextrin, disclosed by Lau '266, with a reasonable expectation of success.

#### **(10) Response to Argument**

##### Claims 29 and 30:

Appellant notes that Eisenhart mentions Emmons in the "Description of the Prior Art" and does not suggest incorporating the elements of Emmons into the Eisenhart compositions. "The context of this reference clearly indicates that Emmons is considered prior art, an earlier invention that suffers from disadvantages remedied by the invention of Eisenhart." This argument is not persuasive. In fact, as has been stated previously, this is precisely the motivation for combining these references. Eisenhart explicitly describes the disclosed method of adding cyclodextrins to an associative thickener for viscosity modification in order to avoid the need for using organic solvents for this same purpose. Eisenhart refers to Emmons as disclosing hydrophobically modified polyurethane thickeners formulated with organic cosolvents, exactly the undesired component that Eisenhart teaches that the use of a cyclodextrin obviates. The examiner maintains that in view of the generic discussion of associative thickeners, one of ordinary skill would look to the discussion of these thickeners in the prior art for ones to use in the Eisenhart compositions.

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Appellant further argues that Eisenhart's exclusive use of 4,4'-methylene-bis(isocyanatocyclohexane) to the exclusion of all other diisocyanates constitutes a teaching away from the straight and branched chain diisocyanates of claim 29. This argument is not found to be persuasive. The thickener used is not particularly described as a *cyclic* one with a teaching that others should be avoided. One of ordinary skill would merely see it as a representative thickener to further describe the invention. If Appellant were correct as to what constituted a teaching away, one of ordinary skill would just as likely find that this embodiment using a hydrophobically modified polyurethane thickeners taught away from using any other type of thickener. This is clearly not the case, as seen from, for example, reference claim 6. The examiner maintains that it would have been within the scope of the artisan to select any of the urethane thickeners disclosed by Emmons to use in the Eisenhart method.

Appellant provides a number of tables comprising the viscosity data from two urethane thickeners, one derived from 1,6-hexamethylene diisocyanate (HDI – straight chained) and one derived from 4,4'-methylene-bis(isocyanatocyclohexane) (Des W – cyclic). Appellant notes that in each example, the viscosity reduction with the urethane thickener derived from HDI is greater than that seen with the thickener derived from Des W. This result is not found to be unexpected. As has been discussed throughout prosecution, Eisenhart teaches that the basis of the viscosity reduction is the interaction of the hydrophobe and the cyclodextrin. This interaction is based on the physical structure of the hydrophobe and the cavity of the cyclodextrin. The fact that two hydrophobes with very different structures give consistently different results is not unexpected. If several hydrophobes of similar structure gave one result and another, similar in structure to the others, gave another result, this would be unexpected. The fact that two different structures give

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two different results is not unexpected. These are differences that would be seen by combining the references as would be obvious.

Appellant argues that the suggestion that variations based on structure is highly speculative. The examiner respectfully disagrees because as set forth above, Eisenhart has taught that the viscosity reduction is based on complexation/decomplexation of the hydrophobic moieties with the cyclodextrin. Holding the particular cyclodextrin constant, the interaction between these two is governed by the structure of the hydrophobe. Variation in this interaction is to be expected.

Appellant further argues that this result has practical and statistical significance. That may be, but these differences are the unexpected ones that would be found by the artisan following the obvious combination of Eisenhart and Emmons.

Appellant further argues that it would be reasonable to extrapolate the HDI results to the other recited diisocyanates and cyclodextrin because of their common structural features. This appears to be at odds with Appellant's assertion that differences based on structural differences are merely speculative. If one can expect similar results based on similarities in structure, it is not clear why one would not also expect differences in results based on different structures.

Claim 1:

Appellant argues that there is no reference to generically modified  $\alpha$ -,  $\beta$ - and  $\gamma$ -cyclodextrins in Eisenhart and that the reference "teaches hydroxyethyl- and hydroxypropyl-modified cyclodextrins, without specifying whether they are the  $\alpha$ -,  $\beta$ - and  $\gamma$ -forms." Appellant cites Eisenhart at col 3, lines 50-63. The examiner notes that that section suggests the use of

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“modified cyclodextrins, such as for example those produced by the process described” in a UK patent. The examiner notes that the reference suggests modified ones with a couple of particular examples. With respect to the contention that there is no specification as to form, when the reference unambiguously discusses  $\alpha$ -,  $\beta$ - and  $\gamma$ -cyclodextrins (see col 2, lines 51-57) and then goes on to suggest modified forms, it is not clear what other forms one of ordinary skill would surmise was being taught in the reference.

Appellant argues that Eisenhart’s teaching of water-soluble cyclodextrins teaches away from methyl cyclodextrin, such a methyl- $\alpha$ -cyclodextrin because one of ordinary skill would expect that replacing polar hydroxyl groups with “non-polar” methyl ether groups would make the cyclodextrin less soluble and less desirable. Appellant further notes that this argument was countered in the advisory action of 12/1/09 by noting that “methylated cyclodextrins are well known in the art to be quite soluble.” Appellant argues that “focusing on the absolute solubility of methylated cyclodextrins misses the point. Based on general chemical knowledge, Appellant was pointing out that a modification of cyclodextrin in which a polar hydroxyl group is replaced with a non-polar method will tend to decrease the solubility of the modified cyclodextrin relative to the unmodified cyclodextrin.” It appears to be Appellant’s position is that at some time when methylated cyclodextrins were merely a hypothetical possibility and before they were prepared and characterized, one of ordinary skill would expect that this substitution would result in a less soluble product than the unsubstituted version. That may or may not be, but at the time the invention was made, one of ordinary skill would not have to rely on such suppositions, as methylated cyclodextrins were already available and well characterized. Furthermore,

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methylated- $\beta$ -cyclodextrin was disclosed by Lau '709 for use as a viscosity modifier for hydrophobically modified thickeners.

Appellant objects to Lau '266 because it teaches a polymerization method and not a composition for viscosity suppression of urethane thickeners. The examiner notes that if Lau '266 had taught such a composition, the claim would be anticipated. However, as clearly stated in the Office action Lau '266 was used to demonstrate that methylated  $\alpha$ -cyclodextrin was a known product.

Appellant further argues that there is no motivation to replace methyl- $\beta$ -cyclodextrin with methyl- $\alpha$ -cyclodextrin, and that at best "Lau '266 serves as a disclosure for the existence of methyl- $\alpha$ -cyclodextrin." As noted above, that was the purpose. The motivation to use it comes from the combination of the other three references, as set forth in the rejection above.

Appellant further argues that it would not be obvious to substitute methyl- $\alpha$ -cyclodextrin for methyl- $\beta$ -cyclodextrin because of the differences in cavity size ( $\alpha$  is smaller) and solubility ( $\alpha$  is more water soluble). With respect to cavity size, Eisenhart suggests the use of  $\alpha$ -,  $\beta$ - and  $\gamma$ -cyclodextrins for this purpose. The differences in cavity sizes are well known in the art. Again, the reference further teaches that the viscosity modification depends on the interaction between the hydrophobic moiety and the cavity. Therefore, one of ordinary skill would understand that each size of cyclodextrin would be expected to be useful, with some working better for some thickeners and less well for others, depending on the size of the hydrophobe. With respect to solubility, it would appear that in light of the teachings of Eisenhart (more soluble is better than less soluble), one of ordinary skill would have added motivation to use methyl- $\alpha$ -cyclodextrin due to the increased solubility.

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Appellant cite evidence of greater viscosity reduction for both HDI and Des W with methyl- $\alpha$ -cyclodextrin as compared to methyl- $\beta$ -cyclodextrin. As discussed above, differences based on size of the hydrophobic moiety and the particular cyclodextrin are to be expected. Appellant has not explained why these particular results are unexpected, as opposed to different from each other.

Obvious-type Double Patenting:

With respect to the ODP rejection based on claim 4 of Harris et al (US 7,125,919) in view of Emmons, Appellant contends that “the discussion of the patentability of claim 29 over Eisenhart in view of Emmons in the preceding section of this paper applies to the double patenting rejection of claim 29 as well” without further elaboration. In response to subsequent ODP rejections, Appellant again cites the arguments against the art rejections. Therefore, Appellant presents no arguments in this section not already addressed above.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner’s answer.



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For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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